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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,247	03/23/2004	Naoto Horiguchi	042261	1770

38834 7590 09/19/2005

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER	
TRAN, THANH Y	

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/806,247	NAOTO HORIGUCHI	
	Examiner	Art Unit	
	Thanh Y. Tran	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) *8-10* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/23/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Applicant's election without traverse of Group II (claims 1-7) in the reply filed on 9/6/05 is acknowledged.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curello (U.S. 6,503,844) in view of Taka et al. (U.S. 4,853,342).

As to claim 1, Curello discloses: a method for manufacturing a semiconductor device comprising the steps of: forming a gate ("gate oxide layer 42") over a semiconductor region ("substrate 40"); forming a first junction ("a source 64") by doping an n-type impurity less diffusive than phosphorus in the semiconductor region ("substrate 40") by using the gate ("gate oxide layer 42") as a mask; and forming a second junction ("a drain 66") by doping an n-type impurity in the semiconductor region "(substrate 40") by using at least the gate ("gate oxide layer 42") as a mask, the second junction ("a drain 66") being deeper than the first junction ("a source 64"), the second junction ("a drain 66") overlapping "(produce some gate overlap") with the first junction ("a source 64") with leaving a part of the first junction ("a source 64") existing under the gate ("gate oxide layer 42") (see figures 2-3; column 3, lines 65-67; column 4, lines 1-4, lines 56-62.

Curello does not disclose the step of forming the first junction includes at least a

first ion implantation which is carried out with a first acceleration energy and a first dose, and a second ion implantation which is carried out with a second acceleration energy higher than the first acceleration energy and a second dose lower than the first dose.

Taka et al. disclose: the step of forming the first junction includes at least a first ion implantation which is carried out with a first acceleration energy "an acceleration energy of about 40 KeV) and a first dose ("1x10.sup.16/cm^{-2}"), and a second ion implantation which is carried out with a second acceleration energy (180 KeV) higher than the first acceleration energy (40 KeV) and a second dose (5x10.sup.11/cm^{-2}) lower than the first dose ("1x10.sup.16/cm^{-2}") (see column 3, lines 39-44; column 4, lines 7-11). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to ion implant with specific acceleration energy and dose in semiconductor substrate of Curello as taught by Taka et al. for the purpose of obtaining a desired carrier density distribution.

As to claim 2, Curello does not disclose in the step of forming the first junction, arsenic is used as the less diffusive n-type impurity. Taka et al. disclose in the step of forming the first junction, arsenic is used as the less diffusive n-type impurity (As^+ ions implantation) (see column 3, lines 42-44). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to ion implant with arsenic in semiconductor substrate of Curello as taught by Taka et al. for the purpose of providing a less diffusive n-type impurity.

As to claim 3, Curello does not disclose a step of forming the first junction includes a third ion implantation which is carried out with a third acceleration energy and a third dose, in addition to the first and second ion implantations.

Taka et al. disclose a step of forming the first junction includes a third ion implantation ("third ion-implantation") which is carried out with a third acceleration energy (40 KeV) and a third dose ($1.5x10^{11}$ cm^{-2}), in addition to the first and second ion implantations (see column 4, lines 13-15). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide a third ion implantation in a substrate of Curello as taught by Taka et al. for the purpose of providing a better n-type collector region on the entire substrate (see column 4, lines 5-7).

As to claim 4, Curello discloses a step of forming side walls ("sidewall 60") over both sides of the gate ("gate 42"), and wherein the step of forming the second junction ("drain 66") is carried out by using the gate ("oxide gate 42") and the side walls ("sidewall 60") as a mask (see figures 2-3; column 4, lines 46-62).

As to claim 5, Curello discloses a step of processing the gate ("gate 42") to take the shape of a notch ("notches 56"), and wherein the step of forming the first junction ("source 64") is carried out by using the gate ("gate 42") in the shape of the notch ("notch 56") as a mask (see figures 2-5; column 4, lines 21-26, lines 46-48).

As to claim 6, Curello does not disclose a step of doping a p-type impurity in the surface layer of the semiconductor region by using the gate as a mask.

Taka et al. disclose a step of doping a p-type impurity ("p-type") in the surface layer of the semiconductor region (polysilicon layer 33) by using the gate as a mask. (see figure 1J; column 5, lines 17-24). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide a p-type impurity doping in a

semiconductor substrate of Curello as taught by Taka et al. for the purpose of obtaining a p-type region in a transistor.

As to claim 7, Curello does not disclose a second ion implantation is carried out with the acceleration energy of 20 keV to 30 keV and the dose of 1.times.10.sup.13/cm.sup.2 to 3.times.10.sup.13/cm.sup.2.

Taka et al. disclose a second ion implantation is carried out with the acceleration energy of 20 keV to 30 keV ("30 KeV") and the dose of 1.times.10.sup.13/cm.sup.2 to 3.times.10.sup.13/cm.sup.2. ("$1x10^{14}$ cm^{-2}") (see figures 1-2; column 4, lines 11-13; column 5, lines 7-10). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide a range in acceleration energy and the dose in a semiconductor substrate of Curello as taught by Taka et al. for the purpose of providing a desired carrier density distribution.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tsou et al (U.S. 6,509,219); Leobandung (U.S. 6,649,460); Nguyen (U.S. 6,875,668) and Kodama (U.S. 5,366,915) disclose relevant prior arts to the instant invention.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Y. Tran whose telephone number is (571) 272-2110. The examiner can normally be reached on M-F (9-6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TYT

AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800